Measurements of the H-1 and F-19 nuclear magnetic resonance (NMR) second moments were performed for a polycrystalline sample of (PyH)BF₄, whereas the shape of the H-2 NMR line was analysed for a polycrystalline sample of (d(5)PyH)BF₄. Asymmetry parameter Delta has been calculated for four models of pyridinium cation reorientation among inequivalent potential energy minima, using the experimental value of the H-1 NMR second moment as well as the H-2 NMR line width. From knowledge of the potential shape and the population of its minima, the temperature dependence of polarization for all the models has been found. From the comparison of the experimentally determined polarization with the calculated polarization, the most appropriate model of the pyridinium cation reorientation has been chosen.